

Unit 8

Day 3

The Quadratic Formula

DERIVATION OF THE QUADRATIC FORMULA

$$ax^2 + bx + c = 0$$

complete the square to solve
for x

$$\frac{ax^2 + bx}{a} = -\frac{c}{a}$$

$$x^2 + \frac{b}{a}x = -\frac{c}{a}$$

$$\left(\frac{b}{a} \cdot \frac{1}{2}\right)^2 = \left(\frac{b}{2a}\right)^2 = \frac{b^2}{4a^2}$$

$$x^2 + \frac{b}{a}x + \frac{b^2}{4a^2} = \frac{b^2}{4a^2} - \left(\frac{c}{a}\right)\frac{4a}{4a}$$

$$\left(x + \frac{b}{2a}\right)^2 = \frac{b^2}{4a^2} - \frac{4ac}{4a^2}$$

$$\left(x + \frac{b}{2a}\right)^2 = \frac{b^2 - 4ac}{4a^2}$$

$$x + \frac{b}{2a} = \pm \sqrt{\frac{b^2 - 4ac}{4a^2}}$$

$$x = -\frac{b}{2a} \pm \frac{\sqrt{b^2 - 4ac}}{2a}$$

$$\boxed{x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}}$$

1) $2x^2 + 4x - 7 = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$a=2$ $b=4$ $c=-7$

$$x = \frac{-4 \pm \sqrt{4^2 - 4(2)(-7)}}{2(2)}$$

$$x = \frac{-4 \pm \sqrt{16 + 56}}{4}$$

$$x = \frac{-4 \pm \sqrt{72}}{4} = \frac{-4 \pm 6\sqrt{2}}{4}$$

$$\frac{-2 \pm 3\sqrt{2}}{2}$$

$$2) \left(\frac{1}{3}m^2 + \frac{1}{5}m + \frac{1}{15} = 0 \right) | \cdot 15$$

$$5m^2 + 3m + 1 = 0$$

$$a = 5 \quad b = 3 \quad c = 1$$

$$x = \frac{-3 \pm \frac{i\sqrt{11}}{10}}{10}$$

$$x = \frac{-3 \pm \sqrt{3^2 - 4(5)(1)}}{2(5)}$$

$$x = \frac{-3 \pm \sqrt{9 - 20}}{10} = \frac{-3 \pm \sqrt{-11}}{10}$$

$$3) \quad a^2 + a\sqrt{3} + 5 = -2$$

$$a^2 + a\sqrt{3} + 7 = 0$$

$$a = -1 \quad b = \sqrt{3} \quad c = 7$$

HW pg 118-119 23-34, 39-44 all